

**NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety  
Washington, D.C. 20594

August 5, 2003

**Meteorology**

**Meteorological Factual Report  
by James T. Skeen, Jr.**

**A. ACCIDENT**

Location: Tillamook Inlet, Garibaldi, Oregon  
Date: June 14, 2003  
Time: 0715 Pacific Daylight Time  
Vessel: M/V TAKI-TOOO  
NTSB Number: DCA03MM035

**B. GROUP**

Chairman: James T. Skeen, Jr.  
Senior Meteorologist  
National Transportation Safety Board  
Washington, D.C.

Member: None

## C. SUMMARY

On June 14, 2003, at 0715 pacific daylight time (pdt), M/V TAKI-TOOO capsized while crossing the bar at Tillamook Bay, Oregon. During the bar crossing, a large wave struck the port side of the TAKI-TOOO, capsizing the vessel. There were two crewmembers and 17 passengers on board. Eleven people died, including the ship's master.

The Meteorological Group Chairman did not participate in the on-scene investigation.

## D. DETAILS OF INVESTIGATION

Notes: Unless noted, in the report all times are edt based on the 24-hour clock. Unless noted, all heights are above mean sea level (msl). Unless noted, all directions refer to true north. Unless noted, all distances are in statute miles. Coordinated Universal Time (UTC) = pdt + 7 hours. UTC = Z.

### 1. Synoptic Situation

The Surface Analysis chart prepared by the National Weather Service (NWS) National Centers for Environmental Prediction (NCEP) for 0800 pdt and satellite-derived near-surface winds for 0658 pdt provided a general overview of conditions over the coastal and offshore waters of Oregon.

Figure 1 shows the NWS NCEP Surface Analysis chart centered on Oregon for 0800 pdt.

The chart indicates a ridge of high pressure situated along the Oregon coastline. Surface observations plotted on the chart indicate that the surface winds were generally light. No precipitation was indicated on the plots. Surface temperatures along the coastline were in the mid 50s Fahrenheit.

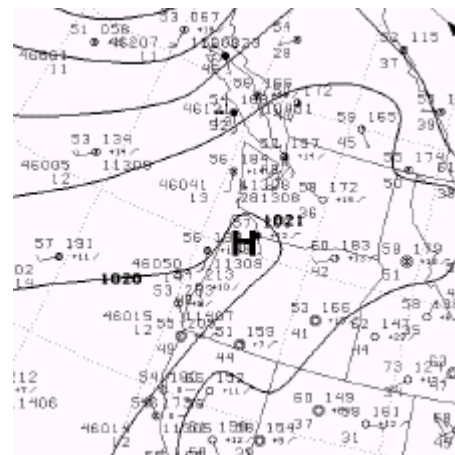
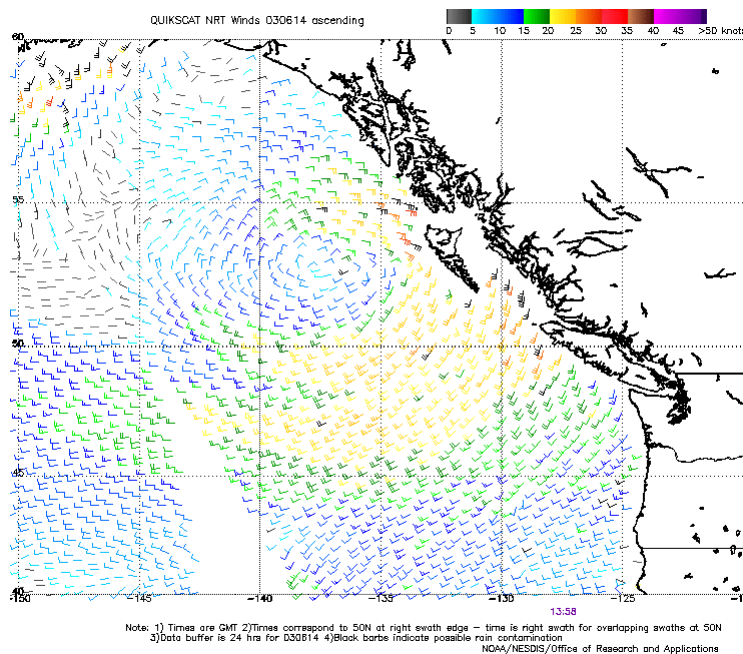


Figure 1. Surface Analysis chart for 0800 pdt June 14, 2003.

Figure 2 shows QuikSCAT satellite wind data for the northwestern Pacific Ocean. The wind plots were taken from the QuikSCAT ascending path at the nominal time of 0658 pdt. Note: The SeaWinds instrument on the QuikSCAT satellite is a specialized radar that measures near-surface wind speed and direction at a 25-kilometer resolution.

The chart indicates a wind circulation center in the Gulf of Alaska with southwesterly winds off the Oregon coastline at generally 10-19 knots.



**Figure 2. QuikSCAT winds for 0658 pdt June 14, 2003.**

## 2. Surface Weather Observations

Wind reports every thirty minutes were available from a NWS anemometer located at Garibaldi. Figure 3 indicates the location of the anemometer at Garibaldi. Note: The chart was obtained from the Maptech Internet site (<http://mapserver.maptech.com/homepage/>) and annotated to show the anemometer's approximate location.



**Figure 3. Garibaldi Anemometer Location.**

Table 1 shows the reported Garibaldi wind directions and speeds at the indicated times.

**Table 1. NWS Garibaldi Wind Reports.**

<b>Time (PDT)</b>	<b>2-min Average Dir (T)/Spd (KT)</b>	<b>1-min Gust Dir (T)/Spd (KT)</b>	<b>30-min Peak Dir (T)/Spd (KT)</b>
0700	133/10	134/9.6	132/11.4
0730	127/9.4	127/9.6	128/9.9

Attachment 1 includes all the Garibaldi wind observations during the period from 0000 to 0931, inclusive.

The closest official aviation weather observations were from Astoria, Oregon.

Following are the Astoria weather observations, in part, surrounding the accident time:

Astoria Regional Airport (KAST), Oregon

field elevation 15 feet msl, located approximately 003 degrees at 36 nautical miles from the accident location, unaugmented Automated Surface Observing System (ASOS)

Time—0555; type—METAR; wind—calm; visibility—10 miles; present weather—none; sky condition—few 4,900 feet overcast 6,000 feet; temperature—12 degrees Celsius; dew point—11 degrees Celsius; altimeter setting—30.09 inches hg; remarks—none=

Time—0655; type—METAR; wind—150 degrees at 4 knots; visibility—8 miles; present weather—none; sky condition—scattered 2,600 feet broken 3,800 feet overcast 4,500 feet; temperature—12 degrees Celsius; dew point—11 degrees Celsius; altimeter setting—30.10 inches hg; remarks—none=

Time—0755; type—METAR; wind—140 degrees at 3 knots; visibility—10 miles; present weather—none; sky condition—broken 4,300 feet broken 5,000 feet overcast 8,000 feet; temperature—12 degrees Celsius; dew point—11 degrees Celsius; altimeter setting—30.12 inches hg; remarks—none=

3. Buoy and Coastal-Marine Automated Network (C-MAN) Observations

The National Data Buoy Center (NDBC), a part of the NWS, develops, operates, and maintains a network of buoy and C-MAN stations.

Data from the nearest buoy and C-MAN stations to Tillamook Bay were obtained from the NDBC Internet site and, in part, follow:

### **Station 46029 – Col River Bar**

**located approximately 325 degrees at 42 nautical miles from the accident location**

[http://www.ndbc.noaa.gov/station\\_page.phtml?station=46029](http://www.ndbc.noaa.gov/station_page.phtml?station=46029)

Following are the standard hourly observations for 46029 during the period from 1700 pdt June 13 (0000 UTC June 14) to 0900 pdt June 14 (1600 UTC June 14). Details concerning the observations can be found at <http://www.ndbc.noaa.gov/measdes.shtml#stdmet>

YYYY	MM	DD	hh	WD	WSPD	GST	WVHT	DPD	APD	MWD	BARO	ATMP	WTMP	DEWP	VIS	PTDY	TIDE
2003	06	14	16	180	4.0	5.0	3.1	13	MM	MM	1019.8	12.9	12.8	10.9	MM	+1.2	MM
2003	06	14	15	180	5.0	7.0	3.6	13	MM	MM	1019.5	12.6	12.6	10.5	MM	+1.4	MM
2003	06	14	14	200	3.0	4.0	3.6	13	MM	MM	1018.9	13.3	12.8	11.3	MM	+1.0	MM
2003	06	14	13	200	4.0	5.0	3.9	13	MM	MM	1018.6	13.3	12.9	10.7	MM	+1.1	MM
2003	06	14	12	240	5.0	7.0	3.5	13	MM	MM	1018.1	13.4	12.9	10.1	MM	+0.9	MM
2003	06	14	11	220	5.0	8.0	3.9	13	MM	MM	1017.9	12.9	12.8	10.8	MM	+0.5	MM
2003	06	14	10	200	4.0	6.0	3.6	13	MM	MM	1017.5	12.9	12.8	11.3	MM	+0.6	MM
2003	06	14	09	190	3.0	4.0	3.3	13	MM	MM	1017.2	13.3	12.9	10.4	MM	+0.0	MM
2003	06	14	08	210	5.0	7.0	3.6	13	MM	MM	1017.4	12.9	12.9	8.8	MM	+0.6	MM
2003	06	14	07	220	7.0	9.0	2.8	13	MM	MM	1016.9	13.4	13.3	10.0	MM	+0.6	MM
2003	06	14	06	190	6.0	8.0	2.8	13	MM	MM	1017.1	12.8	13.4	9.9	MM	+0.7	MM
2003	06	14	05	210	5.0	6.0	2.9	13	MM	MM	1016.8	13.4	13.6	8.5	MM	+0.4	MM
2003	06	14	04	200	4.0	5.0	2.8	11	MM	MM	1016.3	13.7	13.6	10.2	MM	+0.0	MM
2003	06	14	03	220	5.0	6.0	2.8	13	MM	MM	1016.4	13.7	13.6	9.4	MM	+0.0	MM
2003	06	14	02	220	5.0	6.0	3.2	13	MM	MM	1016.4	13.7	13.7	9.5	MM	+0.4	MM
2003	06	14	01	220	5.0	6.0	3.1	13	MM	MM	1016.4	14.1	13.6	9.5	MM	+0.6	MM
2003	06	14	00	200	4.0	6.0	2.8	13	MM	MM	1016.4	13.7	13.2	10.3	MM	+0.7	MM

Following are wave data for 46029 during the period from 1700 pdt June 13 (0000 UTC June 14) to 0900 pdt June 14 (1600 UTC June 14). Details concerning the wave data can be found at <http://www.ndbc.noaa.gov/waveobs.shtml>

YYYY	MM	DD	hh	H0	SwH	SwP	WWH	WWP	SwD	WWD	STEEPNESS	AVP	MWD
2003	06	14	16	3.1	3.0	12.5	0.7	3.8	WNW	SW	SWELL	8.0	288
2003	06	14	15	3.6	3.5	12.5	0.8	3.4	WNW	WSW	SWELL	8.5	284
2003	06	14	14	3.5	3.5	12.5	0.0	0	WNW	MM	SWELL	8.4	292
2003	06	14	13	3.9	3.9	12.5	0.0	0	WNW	MM	SWELL	8.6	288
2003	06	14	12	3.5	3.4	12.5	0.8	3.2	WNW	SW	SWELL	8.5	288
2003	06	14	11	3.9	3.7	12.5	1.1	4.0	WNW	WSW	SWELL	9.0	288
2003	06	14	10	3.6	3.6	12.5	0.0	0	WNW	MM	SWELL	9.1	288
2003	06	14	09	3.3	3.3	12.5	0.0	0	WNW	MM	SWELL	8.5	284
2003	06	14	08	3.6	3.4	12.5	1.0	4.0	WNW	SSW	SWELL	8.9	288
2003	06	14	07	2.8	2.6	12.5	1.0	3.6	WNW	SSW	SWELL	8.3	288
2003	06	14	06	2.8	2.6	12.5	1.1	5.9	W	SW	SWELL	8.1	280
2003	06	14	05	2.9	2.7	12.5	0.9	4.5	W	SSW	SWELL	8.3	276
2003	06	14	04	2.8	2.7	11.1	0.8	3.3	W	WSW	SWELL	7.7	280
2003	06	14	03	2.8	2.8	12.5	0.0	0	WNW	MM	SWELL	7.8	292
2003	06	14	02	3.2	3.1	12.5	0.8	3.7	WNW	SW	SWELL	8.1	292
2003	06	14	01	3.1	3.0	12.5	0.8	3.1	W	SW	SWELL	8.1	280
2003	06	14	00	2.8	2.8	12.5	0.0	0	WNW	MM	SWELL	7.8	284

### **Station 46050 – Stonewall Banks**

**located approximately 205 degrees at 61 nautical miles from the accident location**

[http://www.ndbc.noaa.gov/station\\_page.phtml?station=46050](http://www.ndbc.noaa.gov/station_page.phtml?station=46050)

Following are the standard hourly observations for 46050 during the period from 1700 pdt June 13 (0000 UTC June 14) to 0900 pdt June 14 (1600 UTC June 14). Details concerning the observations can be found at <http://www.ndbc.noaa.gov/measdes.shtml#stdmet>

YYYY	MM	DD	hh	WD	WSPD	GST	WVHT	DPD	APD	MWD	BARO	ATMP	WTMP	DEWP	VIS	PTDY	TIDE
2003	06	14	16	170	6.0	8.0	3.9	11	MM	MM	1020.4	13.7	14.3	MM	MM	+1.2	MM
2003	06	14	15	170	7.0	8.0	3.8	13	MM	MM	1019.8	13.6	14.3	MM	MM	+1.0	MM

2003	06	14	14	170	6.0	8.0	4.1	13	MM	MM	1019.3	13.7	14.3	MM	MM	+0.7	MM
2003	06	14	13	170	4.0	5.0	4.2	13	MM	MM	1019.2	13.9	14.4	MM	MM	+0.8	MM
2003	06	14	12	190	6.0	7.0	4.0	13	MM	MM	1018.8	14.1	14.3	MM	MM	+0.6	MM
2003	06	14	11	210	5.0	6.0	3.8	14	MM	MM	1018.6	14.4	14.3	MM	MM	+0.0	MM
2003	06	14	10	200	5.0	6.0	3.9	13	MM	MM	1018.4	14.3	14.3	MM	MM	+0.4	MM
2003	06	14	09	210	4.0	5.0	3.0	13	MM	MM	1018.2	14.1	14.4	MM	MM	+0.0	MM
2003	06	14	08	250	5.0	7.0	3.2	13	MM	MM	1018.4	13.8	14.5	MM	MM	+0.9	MM
2003	06	14	07	210	6.0	8.0	3.2	13	MM	MM	1018.0	14.4	14.5	MM	MM	MM	MM
2003	06	14	06	200	6.0	7.0	2.9	13	MM	MM	1018.0	14.3	14.5	MM	MM	+1.0	MM
2003	06	14	05	220	6.0	7.0	2.6	13	MM	MM	1017.5	14.4	14.7	MM	MM	+0.6	MM
2003	06	14	03	200	5.0	6.0	2.9	13	MM	MM	1017.0	14.3	14.6	MM	MM	+0.0	MM
2003	06	14	02	210	4.0	6.0	2.7	13	MM	MM	1016.9	14.3	14.6	MM	MM	+0.0	MM
2003	06	14	01	210	4.0	5.0	3.1	13	MM	MM	1016.9	14.4	14.7	MM	MM	+0.4	MM
2003	06	14	00	210	5.0	6.0	3.2	13	MM	MM	1016.9	14.4	14.7	MM	MM	+0.5	MM

Following are wind data during the period from 0500 pdt (1200 UTC) to 0900 pdt (1600 UTC). Note: Corresponding data were not available from station 46029. Details concerning the wind data can be found at <http://www.ndbc.noaa.gov/measdes.shtml#cwind>

YYYY	MM	DD	hh	mm	DIR	SPD	GDR	GSP	GMN
2003	06	14	16	50	180	5.5	160	8.0	5
2003	06	14	16	40	178	5.6	999	99.0	99
2003	06	14	16	30	174	6.1	999	99.0	99
2003	06	14	16	20	170	6.4	999	99.0	99
2003	06	14	16	10	165	6.5	999	99.0	99
2003	06	14	16	00	168	6.5	999	99.0	99
2003	06	14	15	50	169	6.2	150	8.0	39
2003	06	14	15	40	168	6.3	999	99.0	99
2003	06	14	15	30	169	6.3	999	99.0	99
2003	06	14	15	20	171	6.4	999	99.0	99
2003	06	14	15	10	170	6.3	999	99.0	99
2003	06	14	15	00	166	6.3	999	99.0	99
2003	06	14	14	50	169	6.6	140	9.0	2
2003	06	14	14	40	169	6.7	999	99.0	99
2003	06	14	14	30	168	6.4	999	99.0	99
2003	06	14	14	20	165	6.4	999	99.0	99
2003	06	14	14	10	162	6.8	999	99.0	99
2003	06	14	14	00	164	6.4	999	99.0	99
2003	06	14	13	50	166	6.4	150	8.0	32
2003	06	14	13	40	171	6.2	999	99.0	99
2003	06	14	13	30	174	6.1	999	99.0	99
2003	06	14	13	20	175	5.8	999	99.0	99
2003	06	14	13	10	184	5.1	999	99.0	99
2003	06	14	13	00	191	4.3	999	99.0	99
2003	06	14	12	50	173	3.9	180	8.0	55
2003	06	14	12	40	164	3.7	999	99.0	99
2003	06	14	12	30	160	3.6	999	99.0	99
2003	06	14	12	20	162	5.2	999	99.0	99
2003	06	14	12	10	177	6.2	999	99.0	99
2003	06	14	12	00	186	5.8	999	99.0	99

Following are wave data for 46050 during the period from 1700 pdt June 13 (0000 UTC June 14) to 0900 pdt June 14 (1600 UTC June 14). Details concerning the wave data can be found at <http://www.ndbc.noaa.gov/waveobs.shtml>

YYYY	MM	DD	hh	H0	SwH	SwP	WWH	WWP	SwD	WWD	STEEPNESS	AVP	MWD
2003	06	14	16	3.9	3.7	11.1	1.2	5.3	N/A	N/A	AVERAGE	8.7	-99
2003	06	14	15	3.8	3.6	12.5	1.2	5.3	N/A	N/A	SWELL	8.7	-99
2003	06	14	14	4.1	4.1	12.5	0.0	0	N/A	N/A	SWELL	9.2	-99
2003	06	14	13	4.2	4.2	12.5	0.0	0	N/A	N/A	AVERAGE	9.7	-99
2003	06	14	12	4.0	4.0	12.5	0.0	0	N/A	N/A	SWELL	9.5	-99
2003	06	14	11	3.8	3.8	14.3	0.0	0	N/A	N/A	SWELL	9.9	-99
2003	06	14	10	3.9	3.9	12.5	0.0	0	N/A	N/A	SWELL	10.1	-99
2003	06	14	09	3.0	2.9	12.5	0.7	3.7	N/A	N/A	SWELL	9.4	-99
2003	06	14	08	3.2	3.2	12.5	0.0	0	N/A	N/A	SWELL	9.3	-99
2003	06	14	07	3.1	3.1	12.5	0.0	0	N/A	N/A	SWELL	9.7	-99
2003	06	14	06	2.9	2.9	12.5	0.0	0	N/A	N/A	SWELL	9.4	-99
2003	06	14	05	2.5	2.5	12.5	0.0	0	N/A	N/A	SWELL	9.0	-99
2003	06	14	03	2.9	2.9	12.5	0.0	0	N/A	N/A	SWELL	8.8	-99

2003	06	14	02	2.7	2.7	12.5	0.0	0	N/A	N/A	SWELL	8.1	-99
2003	06	14	01	3.1	3.1	12.5	0.0	0	N/A	N/A	SWELL	8.0	-99
2003	06	14	00	3.2	3.1	12.5	0.9	3.0	N/A	N/A	SWELL	7.9	-99

### **Station NWP03 – Newport, Oregon**

**located approximately 186 degrees at 56 nautical miles from the accident location**

[http://www.ndbc.noaa.gov/station\\_page.phtml?station=nwpo3](http://www.ndbc.noaa.gov/station_page.phtml?station=nwpo3)

Following are the standard hourly observations for NWP03 during the period from 1700 pdt June 13 (0000 UTC June 14) to 0900 pdt June 14 (1600 UTC June 14). Details concerning the observations can be found at <http://www.ndbc.noaa.gov/measdes.shtml#stdmet>

YYYY	MM	DD	hh	WD	WSPD	GST	WVHT	DPD	APD	MWD	BARO	ATMP	WTMP	DEWP	VIS	PTDY	TIDE
2003	06	14	16	070	2.6	3.1	MM	MM	MM	MM	1020.6	13.0	MM	10.0	MM	+1.1	MM
2003	06	14	15	090	3.1	3.6	MM	MM	MM	MM	1020.2	12.4	MM	10.2	MM	+1.0	MM
2003	06	14	14	080	1.5	1.5	MM	MM	MM	MM	1019.9	12.3	MM	10.1	MM	+0.9	MM
2003	06	14	13	150	1.0	1.0	MM	MM	MM	MM	1019.5	12.1	MM	9.6	MM	+0.8	MM
2003	06	14	12	160	2.6	2.6	MM	MM	MM	MM	1019.2	12.2	MM	9.6	MM	+0.4	MM
2003	06	14	11	160	3.1	3.6	MM	MM	MM	MM	1019.0	12.2	MM	9.4	MM	-0.0	MM
2003	06	14	10	160	2.6	3.6	MM	MM	MM	MM	1018.7	12.1	MM	9.2	MM	+0.0	MM
2003	06	14	09	150	2.6	2.6	MM	MM	MM	MM	1018.8	12.1	MM	9.5	MM	+0.0	MM
2003	06	14	08	160	2.6	4.1	MM	MM	MM	MM	1019.0	12.3	MM	9.9	MM	+0.7	MM
2003	06	14	07	170	2.6	3.1	MM	MM	MM	MM	1018.9	12.4	MM	10.9	MM	+1.1	MM
2003	06	14	06	170	3.6	4.1	MM	MM	MM	MM	1018.7	12.8	MM	11.9	MM	+1.1	MM
2003	06	14	05	190	4.1	5.7	MM	MM	MM	MM	1018.3	13.0	MM	12.3	MM	+1.0	MM
2003	06	14	04	190	6.2	7.2	MM	MM	MM	MM	1017.8	13.1	MM	12.4	MM	+0.5	MM
2003	06	14	03	190	5.1	6.2	MM	MM	MM	MM	1017.6	13.3	MM	12.2	MM	+0.3	MM
2003	06	14	02	190	4.6	6.2	MM	MM	MM	MM	1017.3	13.7	MM	12.1	MM	+0.0	MM
2003	06	14	01	210	4.1	5.1	MM	MM	MM	MM	1017.3	14.3	MM	11.3	MM	+0.3	MM
2003	06	14	00	210	5.1	6.2	MM	MM	MM	MM	1017.3	14.6	MM	11.2	MM	+0.3	MM

Following are wind data during the period from 0500 pdt (1200 UTC) to 0950 pdt (1550 UTC). Note: Details concerning the wind data can be found at <http://www.ndbc.noaa.gov/measdes.shtml#cwind>

YYYY	MM	DD	hh	mm	DIR	SPD	GDR	GSP	GMN
2003	06	14	16	50	217	1.5	999	99.0	99
2003	06	14	16	40	199	1.0	999	99.0	99
2003	06	14	16	30	289	1.0	999	99.0	99
2003	06	14	16	20	060	1.0	999	99.0	99
2003	06	14	16	10	081	1.5	999	99.0	99
2003	06	14	16	00	074	2.1	80	4.1	14
2003	06	14	15	50	087	2.1	999	99.0	99
2003	06	14	15	40	091	2.1	999	99.0	99
2003	06	14	15	30	085	2.6	999	99.0	99
2003	06	14	15	20	083	2.6	999	99.0	99
2003	06	14	15	10	077	3.1	999	99.0	99
2003	06	14	15	00	085	2.6	80	3.6	57
2003	06	14	14	50	087	2.6	999	99.0	99
2003	06	14	14	40	086	2.6	999	99.0	99
2003	06	14	14	30	089	2.1	999	99.0	99
2003	06	14	14	20	086	1.5	999	99.0	99
2003	06	14	14	10	086	1.5	999	99.0	99
2003	06	14	14	00	076	1.5	80	2.1	52
2003	06	14	13	50	063	1.0	999	99.0	99
2003	06	14	13	40	081	0.5	999	99.0	99
2003	06	14	13	30	090	0.5	999	99.0	99
2003	06	14	13	20	112	0.5	999	99.0	99
2003	06	14	13	10	114	1.0	999	99.0	99
2003	06	14	13	00	158	1.0	160	3.6	10
2003	06	14	12	50	162	1.5	999	99.0	99
2003	06	14	12	40	158	1.5	999	99.0	99
2003	06	14	12	30	152	2.1	999	99.0	99
2003	06	14	12	20	152	2.1	999	99.0	99
2003	06	14	12	10	159	2.6	999	99.0	99
2003	06	14	12	00	160	2.1	170	4.1	36

#### 4. Climatological Data

A variety of climatological data for 46029, 46050, and NWP03 is available from the NDBC Internet site.

Attachments 2, 3, and 4 contain the Climatic Summary Tables obtained from the NDBC for the above three stations.

Additional climatological data, which is available from the NDBC Internet site, are listed below.

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### **Station 46029 - COL RIVER BAR - 78NM South Southwest of Aberdeen, WA**

Available historical data for station 46029 include:

- **Quality controlled data from May**
  - [Standard Meteorological data](#) and their [description](#)
  - [Spectral wave density data](#) and their [description](#)
  - [Spectral wave\(alpha1\) direction data](#) and their [description](#)
  - [Spectral wave\(alpha2\) direction data](#) and their [description](#)
  - [Spectral wave\(r1\) direction data](#) and their [description](#)
  - [Spectral wave\(r2\) direction data](#) and their [description](#)
- **Quality controlled data from the previous months of 2003 ([data descriptions](#))**
  - **Standard Meteorological data:** [Jan](#) [Feb](#) [Mar](#) [Apr](#)
  - **Spectral wave density data:** [Jan](#) [Feb](#) [Mar](#) [Apr](#)
  - **Spectral wave(alpha1) direction data:** [Jan](#) [Feb](#) [Mar](#) [Apr](#)
  - **Spectral wave(alpha2) direction data:** [Jan](#) [Feb](#) [Mar](#) [Apr](#)
  - **Spectral wave(r1) direction data:** [Jan](#) [Feb](#) [Mar](#) [Apr](#)
  - **Spectral wave(r2) direction data:** [Jan](#) [Feb](#) [Mar](#) [Apr](#)
- **[Historical data](#) ([data descriptions](#))**
  - **Standard meteorological data:** [1984](#) [1985](#) [1986](#) [1987](#) [1991](#) [1992](#) [1993](#) [1994](#) [1995](#) [1996](#) [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
  - **Spectral wave density data:** [1996](#) [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
  - **Spectral wave(alpha1) direction data:** [1996](#) [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
  - **Spectral wave(alpha2) direction data:** [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
  - **Spectral wave(r1) direction data:** [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)



- Spectral wave(r2) direction data: [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
- Climatic summary [table](#) (PDF) and plots
  - [wind speed](#)
  - [air temperature](#)
  - [sea temperature](#)
  - [air-sea temperature](#)
  - [dew point temperature](#)
  - [air-dew point temperature](#)
  - [sea level pressure](#)
  - [wind gust](#)
  - [significant wave height](#)
  - [average wave period](#)
  - [dominant wave period](#)

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## Station 46050 - STONEWALL BANKS - 20NM West of Newport, OR

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Available historical data for station 46050 include:

- Quality controlled data from May
  - [Standard Meteorological data](#) and their [description](#)
  - [Continuous winds data](#) and their [description](#)
  - [Spectral wave density data](#) and their [description](#)
- Quality controlled data from the previous months of 2003 ([data descriptions](#))
  - Standard Meteorological data: [Jan](#) [Feb](#) [Mar](#) [Apr](#)
  - Continuous winds data: [Jan](#) [Feb](#) [Mar](#) [Apr](#)
  - Spectral wave density data: [Jan](#) [Feb](#) [Mar](#) [Apr](#)
- [Historical data](#) ([data descriptions](#))
  - Standard meteorological data: [1991](#) [1992](#) [1993](#) [1994](#) [1995](#) [1996](#) [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
  - Continuous winds data: [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
  - Spectral wave density data: [1996](#) [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
  - Spectral wave(alpha1) direction data: [1996](#)
  - Water level data: [1997](#)
- Climatic summary [table](#) (PDF) and plots

- [wind speed](#)
- [air temperature](#)
- [sea temperature](#)
- [air-sea temperature](#)
- [sea level pressure](#)
- [peak wind](#)
- [wind gust](#)
- [significant wave height](#)
- [average wave period](#)
- [dominant wave period](#)

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## Station NWPO3 - Newport, OR

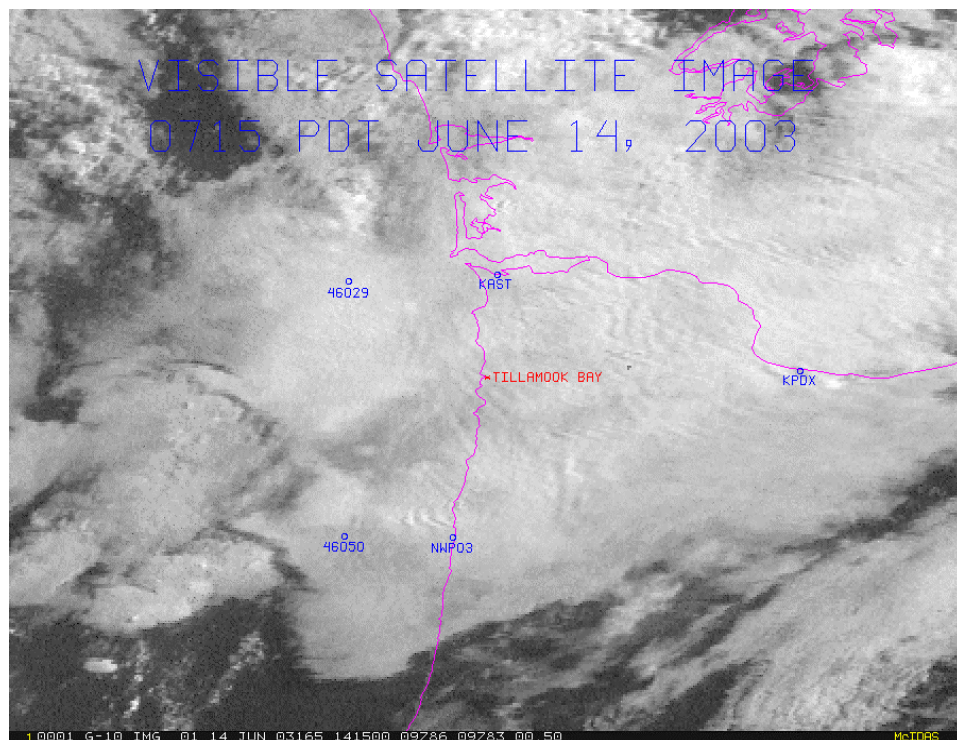
Available historical data for station NWPO3 include:

- **Quality controlled data from May**
    - [Standard Meteorological data](#) and their [description](#)
    - [Continuous winds data](#) and their [description](#)
  - **Quality controlled data from the previous months of 2003 ([data descriptions](#))**
    - **Standard Meteorological data:** [Jan](#) [Feb](#) [Mar](#) [Apr](#)
    - **Continuous winds data:** [Jan](#) [Feb](#) [Mar](#) [Apr](#)
  - **[Historical data](#) ([data descriptions](#))**
    - **Standard meteorological data:** [1985](#) [1986](#) [1987](#) [1988](#) [1989](#) [1990](#) [1991](#) [1992](#) [1993](#) [1994](#) [1995](#) [1996](#) [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
    - **Continuous winds data:** [1997](#) [1998](#) [1999](#) [2000](#) [2001](#) [2002](#)
  - **Climatic summary [table](#) (PDF) and plots**
    - [wind speed](#)
    - [air temperature](#)
    - [dew point temperature](#)
    - [air-dew point temperature](#)
    - [sea level pressure](#)
    - [peak wind](#)
    - [wind gust](#)
-

## 5. Satellite Data

GOES-10 (Geostationary Operational Environmental Satellite-10) digital data centered on the Tillamook Bay area were obtained through McIDAS<sup>1</sup> and displayed on a NTSB McIDAS workstation. The nominal resolution of the visible data was 1 kilometer.

Figure 4 shows a McIDAS plot of the visible channel centered on Tillamook Bay for the nominal time of 0715 pdt (1415 UTC). The plot is a Mercator projection and X 2 magnified. A map background, Tillamook Bay, Portland (KPDX), KAST, Station 46029, Station 46050, and NWP03 are overlaid on the image.



**Figure 4. Visible satellite image for 0715 pdt June 14, 2003.**

## 6. Weather Radar Data

Safety Board staff obtained Portland Weather Surveillance Radar-1988, Doppler (KPDX WSR-88D) Base Reflectivity products from the Unidata archive and displayed them using McIDAS. Note: The University Corporation for Atmospheric Research (UCAR) Unidata Program is funded by the National Science Foundation.

Figure 5 shows a KPDX radar reflectivity product centered on Tillamook Bay for the nominal time of 0717 pdt. The product is for the 0.5-degree antenna elevation angle.

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<sup>1</sup> Man computer Interactive Data System (MCIDAS) is a meteorological and data analyses computer-based system developed by the Space Science and Engineering Center at the University of Wisconsin at Madison, Wisconsin.

No echoes are indicated in the vicinity of Tillamook Bay.

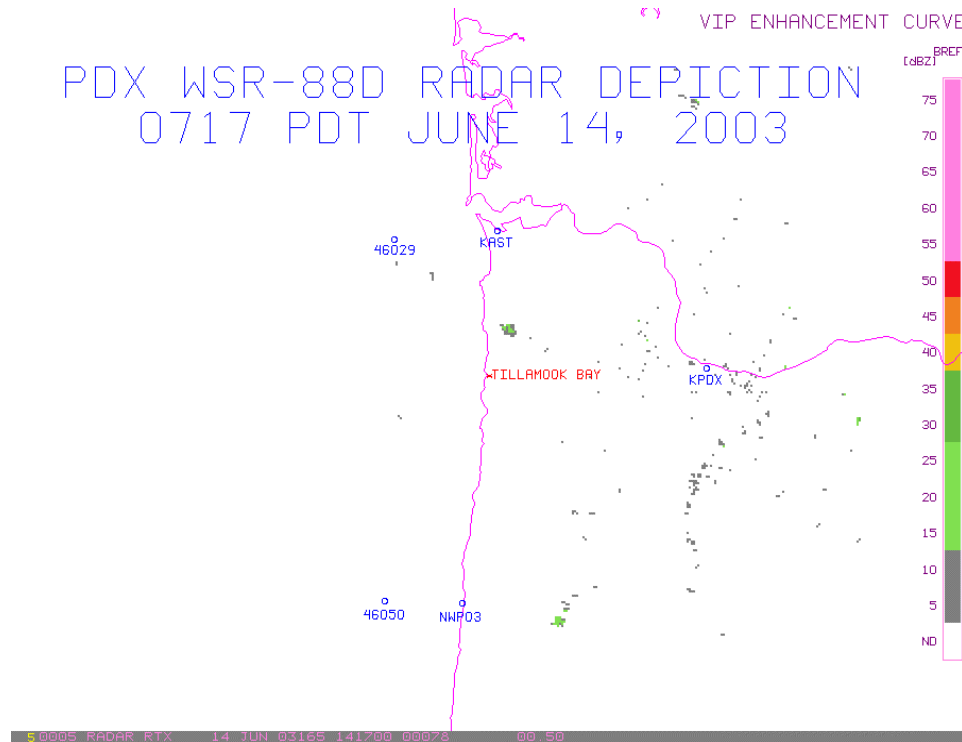


Figure 5. PDX radar reflectivity depiction for 0717 pdt June 14, 2003.

## 8. NWS Forecasts and Advisories

### Coastal Waters Forecasts and Small Craft Advisories

The NWS Weather Forecast Office (WFO) at Portland, Oregon, prepared Coastal Waters Forecasts and Small Craft Advisories for the coastal waters off Tillamook Bay. Figure 6 shows a depiction of the Portland WFO's marine area of responsibility.

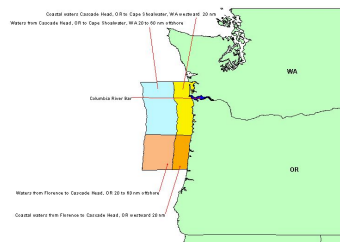


Figure 6. NWS Portland Coastal Waters Forecast area.

Following are the Coastal Waters Forecasts and Small Craft Advisories issued at 2130 pdt June 13 and 0330 and 0930 pdt June 14. Note: According to the Meteorologist-in-Charge at the Portland office, the Small Craft Advisory for Hazardous Seas was issued at 1645 pdt June 13.

2130 pdt June 13

FZUS56 KPQR 140432

2003165

0435

CWFPQR

COASTAL WATERS FORECAST

NATIONAL WEATHER SERVICE PORTLAND OREGON

930 PM PDT FRI JUN 13 2003

COASTAL WATERS FROM CAPE SHOALWATER WASHINGTON TO FLORENCE OREGON  
AND WESTWARD 60 NM

PZZ200-141030-

.SYNOPSIS FOR SOUTHERN WASHINGTON AND NORTHERN OREGON COAST...

A WEAK PAC FRONT WILL BRUSH ACROSS THE NORTHERN WATERS SAT. HIGH  
PRES WILL REBUILD IN THE N ON SUN.

\$\$

PZZ250-255-270-275-141030-

COASTAL WATERS FROM CAPE SHOALWATER WASHINGTON TO FLORENCE OREGON  
AND WESTWARD 60 NM

930 PM PDT FRI JUN 13 2003

...SMALL CRAFT ADVISORY FOR HAZARDOUS SEAS...

PZZ270-250-141030-

COASTAL WATERS FROM CAPE SHOALWATER WASHINGTON TO CASCADE HEAD  
OREGON AND WESTWARD 60 NM

930 PM PDT FRI JUN 13 2003

.TONIGHT...S WIND 15 KT. WIND WAVES 4 FT. W SWELL 10 FT AT 11  
SECONDS. CHANCE OF SHOWERS.

.SAT...S WIND 10 KT...BECOMING W 15 KT IN THE AFTERNOON. WIND  
WAVES 2 FT. W SWELL 12 FT AT 14 SECONDS.

.SAT NIGHT...NW WIND 15 KT...EASING TO 10 KT AFTER MIDNIGHT.

WIND WAVES 2 FT. W SWELL 10 FT AT 14 SECONDS.

.SUN...NW WIND 10 KT...RISING TO 15 KT IN THE AFTERNOON. WIND  
WAVES 3 FT. W SWELL 8 FT.

.SUN NIGHT...N WIND 15 KT. WIND WAVES 3 FT. W SWELL 7 FT.

.MON...N WIND 15 KT...BECOMING NW 20 KT IN THE AFTERNOON. WIND  
WAVES 3 FT. W SWELL 5 FT.

.MON EVENING...NW WIND 20 KT. WIND WAVES 3 FT. W SWELL 5 FT.

.TUE...NW WIND 15 KT. WIND WAVES 3 FT. W SWELL 5 FT.

.WED...NW WIND 15 KT. WIND WAVES 3 FT. W SWELL 5 FT.

\$\$

PZZ275-255-141030-

COASTAL WATERS FROM CASCADE HEAD TO FLORENCE OREGON AND WESTWARD  
60 NM

930 PM PDT FRI JUN 13 2003

...SMALL CRAFT ADVISORY FOR HAZARDOUS SEAS...

.TONIGHT...SW WIND 10 KT. WIND WAVES 3 FT. W SWELL 10 FT AT 11  
SECONDS. CHANCE OF SHOWERS.

.SAT...SW WIND 10 KT...BECOMING NW 15 KT IN THE AFTERNOON. WIND  
WAVES 3 FT. W SWELL 11 FT AT 14 SECONDS.

.SAT NIGHT...NW WIND 15 KT. WIND WAVES 3 FT. W SWELL 10 FT AT  
14 SECONDS.

.SUN...N WIND 15 KT...RISING TO 20 KT IN THE AFTERNOON. WIND  
WAVES 4 FT. W SWELL 8 FT.

.SUN NIGHT...N WIND 20 KT...EASING TO 15 KT AFTER MIDNIGHT.  
WIND WAVES 3 FT. W SWELL 7 FT.

.MON...N WIND 15 KT...BECOMING NW 25 KT IN THE AFTERNOON. WIND  
WAVES 4 FT. W SWELL 6 FT.

.MON EVENING...NW WIND 25 KT. WIND WAVES 4 FT. W SWELL 6 FT.

.TUE...NW WIND 15 KT. WIND WAVES 3 FT. W SWELL 6 FT.

.WED...NW WIND 20 KT. WIND WAVES 4 FT. W SWELL 5 FT.  
\$\$

0330 pdt June 14

FZUS56 KPQR 141018

2003165

1018

CWFPQR

COASTAL WATERS FORECAST

NATIONAL WEATHER SERVICE PORTLAND OREGON

330 AM PDT SAT JUN 14 2003

COASTAL WATERS FROM CAPE SHOALWATER WASHINGTON TO FLORENCE OREGON  
AND WESTWARD 60 NM

PZZ200-141630-

.SYNOPSIS FOR SOUTHERN WASHINGTON AND NORTHERN OREGON COAST...  
A WEAK PAC FRONT WILL BRUSH ACROSS THE NORTHERN WATERS THIS MORNING.  
SWELL FROM A PACIFIC LOW WILL REACH THE COAST TODAY. HIGH PRES  
WILL REBUILD IN THE N ON SUN. A THERMAL TROUGH WILL BUILD OVER  
SOUTHERN OREGON INFLUENCING THE S WATERS ON MON.

\$\$

PZZ250-270-141630-

COASTAL WATERS FROM CAPE SHOALWATER WA TO CASCADE HEAD OR EXTENDING  
WESTWARD 20 NM-

COASTAL WATERS FROM CAPE SHOALWATER WA TO CASCADE HEAD OR EXTENDING  
WESTWARD 20 TO 60 NM-

330 AM PDT SAT JUN 14 2003

...SMALL CRAFT ADVISORY FOR HAZARDOUS SEAS...

.TODAY...S WIND 10 KT...BECOMING W 15 KT IN THE AFTERNOON. WIND WAVES  
3 FT. NW SWELL 11 FT AT 11 SECONDS. CHANCE OF SHOWERS EARLY IN THE  
MORNING.

.TONIGHT...W WIND 15 KT...BECOMING NW 10 KT AFTER MIDNIGHT. WIND  
WAVES 2 FT. NW SWELL 10 FT AT 11 SECONDS.

.SUN...NW WIND 10 KT...RISING TO 15 KT IN THE AFTERNOON. WIND WAVES  
3 FT. NW SWELL 8 FT AT 10 SECONDS.

.SUN NIGHT...NW WIND 15 KT. WIND WAVES 2 FT. NW SWELL 6 FT.

.MON...N WIND 15 KT...BECOMING NW 20 KT IN THE AFTERNOON. WIND WAVES  
3 FT. NW SWELL 4 FT.

.MON EVENING...NW WIND 20 KT. WIND WAVES 3 FT. NW SWELL 4 FT.

.TUE...NW WIND 15 KT. WIND WAVES 3 FT. NW SWELL 2 FT.

.WED...NW WIND 15 KT. WIND WAVES 2 FT. NW SWELL 5 FT.

\$\$

PZZ255-275-141630-

COASTAL WATERS FROM CASCADE HEAD TO FLORENCE EXTENDING WESTWARD 20  
NM-

WATERS FROM CASCADE HEAD TO FLORENCE EXTENDING WESTWARD 20 TO 60 NM-  
330 AM PDT SAT JUN 14 2003

...SMALL CRAFT ADVISORY FOR HAZARDOUS SEAS...

.TODAY...SW WIND 10 KT...BECOMING NW 15 KT IN THE AFTERNOON. WIND  
WAVES 3 FT. NW SWELL 11 FT AT 11 SECONDS. CHANCE OF SHOWERS EARLY IN  
THE MORNING.

.TONIGHT...NW WIND 15 KT. WIND WAVES 3 FT. NW SWELL 10 FT AT 11  
SECONDS.

.SUN...N WIND 15 KT...RISING TO 20 KT IN THE AFTERNOON. WIND WAVES 4  
FT. NW SWELL 7 FT AT 10 SECONDS.

.SUN NIGHT...N WIND 20 KT...EASING TO 15 KT AFTER MIDNIGHT. WIND  
WAVES 3 FT. NW SWELL 5 FT.

.MON...N WIND 15 KT...RISING TO 25 KT IN THE AFTERNOON. WIND WAVES 3  
FT. NW SWELL 4 FT.

.MON EVENING...N WIND 25 KT. WIND WAVES 3 FT. NW SWELL 4 FT.

.TUE...N WIND 15 KT...BECOMING NW 20 KT EARLY IN THE AFTERNOON. WIND WAVES 3 FT. NW SWELL 3 FT.  
.WED...NW WIND 20 KT. WIND WAVES 2 FT. NW SWELL 5 FT.  
\$\$

### 0930 pdt June 14

FZUS56 KPQR 141642 2003165  
1643  
CWFPQR  
COASTAL WATERS FORECAST  
NATIONAL WEATHER SERVICE PORTLAND OREGON  
930 AM PDT SAT JUN 14 2003  
COASTAL WATERS FROM CAPE SHOALWATER WASHINGTON TO FLORENCE OREGON AND WESTWARD 60 NM  
PZZ200-142230-  
.SYNOPSIS FOR SOUTHERN WASHINGTON AND NORTHERN OREGON COAST...  
HIGH PRES WILL BUILD OVER THE COASTAL WATERS TODAY AND SUN. SWELL FROM A PACIFIC LOW WILL REACH THE COAST TODAY. A THERMAL TROUGH WILL BUILD OVER SOUTHERN OREGON INFLUENCING THE S WATERS ON MON.  
\$\$  
PZZ250-255-270-275-142230-  
COASTAL WATERS FROM CAPE SHOALWATER WASHINGTON TO FLORENCE OREGON AND WESTWARD 60 NM  
930 AM PDT SAT JUN 14 2003  
...SMALL CRAFT ADVISORY FOR HAZARDOUS SEAS...  
.TODAY...SW WIND 10 KT...BECOMING W 15 KT IN THE AFTERNOON.  
WIND WAVES 2 FT. W SWELL 12 FT AT 14 SECONDS.  
.TONIGHT...NW WIND 15 KT. WIND WAVES 2 FT. W SWELL 10 FT AT 14 SECONDS.  
.SUN...NW WIND 15 KT...RISING TO 20 KT IN THE AFTERNOON. WIND WAVES 3 FT. W SWELL 8 FT.  
.SUN NIGHT...N WIND 20 KT...EASING TO 15 KT AFTER MIDNIGHT.  
WIND WAVES 3 FT. W SWELL 7 FT.  
.MON...N WIND 15 KT...BECOMING NW 25 KT IN THE AFTERNOON. WIND WAVES 3 FT. W SWELL 6 FT.  
.MON EVENING...NW WIND 25 KT. WIND WAVES 3 FT. W SWELL 6 FT.  
.TUE...N WIND 15 KT...BECOMING NW 20 KT EARLY IN THE AFTERNOON.  
WIND WAVES 3 FT. W SWELL 6 FT.  
.WED...NW WIND 20 KT. WIND WAVES 3 FT. W SWELL 5 FT.  
\$\$

### **Public Zone Forecasts**

Following is the Zone Forecast for Tillamook issued by the Portland WFO at 0430 pdt June 14.

FPUS56 KPQR 141133 2003165  
1133  
ZFPPQR  
NORTHWEST OREGON AND SOUTHWEST WASHINGTON ZONE FORECASTS  
NATIONAL WEATHER SERVICE PORTLAND OREGON  
430 AM PDT SAT JUN 14 2003  
SPOT TEMPERATURES AND PROBABILITIES OF MEASURABLE PRECIPITATION ARE FOR TODAY...TONIGHT...SUNDAY...SUNDAY NIGHT...AND MONDAY.  
ORZ001-WAZ021-141640-  
NORTH OREGON COAST-SOUTH WASHINGTON COAST-

INCLUDING THE CITIES OF...ASTORIA...CANNON BEACH...TILLAMOOK...  
 PACIFIC CITY...NORTH COVE...RAYMOND...LONG BEACH...NASELLE  
 430 AM PDT SAT JUN 14 2003  
 .TODAY...MOSTLY CLOUDY. CHANCE OF SHOWERS EARLY THIS MORNING...THEN A  
 SLIGHT CHANCE OF SHOWERS. HIGHS IN THE LOWER 60S. WEST WIND 5 TO 15  
 MPH.  
 .TONIGHT...MOSTLY CLOUDY. LOWS AROUND 50. SOUTHWEST WIND 5 TO 15 MPH.  
 .SUNDAY...PARTLY CLOUDY. HIGHS IN THE MID 60S. NORTHWEST WIND 10 TO  
 15 MPH.  
 .SUNDAY NIGHT...PARTLY CLOUDY. LOWS IN THE LOWER 50S. NORTHWEST WIND  
 5 TO 15 MPH.  
 .MONDAY...PARTLY CLOUDY. HIGHS IN THE UPPER 60S. NORTHWEST WIND 5 TO  
 15 MPH.  
 .MONDAY NIGHT...PARTLY CLOUDY. LOWS AROUND 50.  
 .TUESDAY...MOSTLY CLOUDY. HIGHS 65 TO 70.  
 .TUESDAY NIGHT...MOSTLY CLOUDY. CHANCE OF SPRINKLES AND DRIZZLE.  
 LOWS 50 TO 55.  
 .WEDNESDAY...MOSTLY CLOUDY. CHANCE OF SPRINKLES AND DRIZZLE IN THE  
 MORNING. HIGHS 60 TO 65.  
 .WEDNESDAY NIGHT...MOSTLY CLOUDY. LOWS 50 TO 55.  
 .THURSDAY...MOSTLY CLOUDY. HIGHS 60 TO 65.  
 .THURSDAY NIGHT...MOSTLY CLOUDY. LOWS 50 TO 55.  
 .FRIDAY...MOSTLY CLOUDY. AREAS OF DRIZZLE IN THE MORNING. HIGHS  
 AROUND 60.  
 .<                      TEMPERATURE                      /                      PRECIPITATION  
 ASTORIA                      63   50   64   51   68   /   30   10   10   00   00  
 \$\$  
 =

## 9. NWS Marine Forecaster Statement

A statement by the Portland WFO marine forecaster, who was on duty at the accident time, is contained in attachment 5.

James T. Skeen, Jr.  
 Senior Meteorologist

Attachments